

## MANUFACTURING METHODS AND SYSTEMS FOR RAPID PRODUCTION OF HEARING-AID SHELLS

### Abstract of the Disclosure

Methods, apparatus and computer program products provide efficient techniques for designing and printing shells of hearing-aid devices with a high degree of quality assurance and reliability and with a reduced number of manual and time consuming production steps and operations.

5 These techniques also preferably provide hearing-aid shells having internal volumes that can approach a maximum allowable ratio of internal volume relative to external volume. These high internal volumes facilitate the inclusion of hearing-aid electrical components having higher degrees of functionality and/or the use of smaller and less conspicuous hearing-aid shells. A preferred method includes operations to generate a watertight digital model of a hearing-aid shell by thickening a three-dimensional digital model of a shell surface in a manner that eliminates self-intersections and results in a thickened model having an internal volume that is a high percentage of an external volume of the model. This thickening operation preferably includes nonuniformly thickening the digital model of a shell surface about a directed path that identifies a location of an undersurface hearing-aid vent. This directed path may be drawn on the shell surface by a technician (e.g., audiologist) or computer-aided design operator, for example. Operations are then preferably performed to generate a digital model of an undersurface hearing-aid vent in the thickened model of the shell surface, at a location proximate the directed path.